

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/007003

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl⁷ G02B15/20, G02B13/18, G02B15/167

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl⁷ G02B15/20, G02B13/18, G02B15/167

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1926-1996	Toroku Jitsuyo Shinan Koho	1994-2004
Kokai Jitsuyo Shinan Koho	1971-2004	Jitsuyo Shinan Toroku Koho	1996-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2001-249275 A (Nikon Corp.), 14 September, 2001 (14.09.01), Full text; all drawings; particularly, Par. Nos. [0041] to [0051]; Fig. 6 (Family: none)	1-2, 14-20
Y	JP 2002-341242 A (Matsushita Electric Industrial Co., Ltd.), 27 November, 2002 (27.11.02), Full text; all drawings (Family: none)	1-2, 14-20
X	JP 2001-228398 A (COSINA CO., LTD.), 24 August, 2001 (24.08.01), Full text; all drawings, particularly, example 1; Fig. 1 (Family: none)	1-2, 14-20

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
24 August, 2004 (24.08.04)Date of mailing of the international search report
07 September, 2004 (07.09.04)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 11-95098 A (Nittoh Kogaku Kabushiki Kaisha), 09 April, 1998 (09.04.98), Full text; all drawings; particularly, example 9; Fig. 17 & US 6075653 A	1-2,14-20
X	JP 2001-4919 A (Fuji Photo Optical Co., Ltd.), 12 January, 2001 (12.01.01), Full text; all drawings; particularly, example 1; Fig. 1 & US 6480340 B1 & DE 10028489 A1	1-2,14-20
X	JP 2000-39556 A (Fuji Photo Optical Co., Ltd.), 28 February, 2000 (28.02.00), Full text; all drawings & US 6115194 A & DE 10028489 A1	1-2,14-20
X	JP 2000-66098 A (Fuji Photo Optical Co., Ltd.), 03 March, 2000 (03.03.00), Full text; all drawings; particularly, example 2; Fig. 1 & US 6038078 A	1-2,14-20

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See extra sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-2, 14-20

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

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Continuation of Box No.III of continuation of first sheet(2)

The invention in claim 1 relates to a zoom lens which comprises a prism disposed between a projection lens and a spatial optical modulation element (B), and is used as the projection lens of a projector, characterized in that a lens closest to the spatial optical modulation element (B) is a meniscus positive lens with its convex plane facing a screen side, and the refractive index of the meniscus positive lens is at least 1.75.

However, since the zoom lens itself is a conventionally known technology as is described in, for example, JP 2001-249275 A (Nikon Corp.), 14. 09. 2001, the invention in claim 1 does not include a technical feature that defines a contribution made as a whole over the prior art, that is, there exists no special technical feature within the meaning of PCT Rule 13.2, second sentence.

Accordingly, whether or not there is a technical relationship among inventions or invention groups in claims dependent on claim 1 involving the same or corresponding technical features will be further studied.

1. The invention in claim 2 relates to a zoom lens that satisfies a conditional expression (1) in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 1") in claim 2 has the technical feature of defining the above conditional expression (1) in order to prevent an unnecessary light, reflected off the plane on the screen side of a lens closest to a spatial optical modulation element, from imaging on the spatial optical modulation element.

2. The invention in claim 3 relates to a zoom lens that satisfies a conditional expression (2) in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 2") in claim 3 has the technical feature of defining the above conditional expression (2) in order to prevent an unnecessary light, reflected off the plane on the screen side of a lens closest to a spatial optical modulation element, from imaging on the spatial optical modulation element.

3. The invention in claim 4 relates to a zoom lens that satisfies a conditional expression (3) in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 3") in claim 4 has the technical feature of defining the above conditional expression (3) in order to favorably correct distortion aberration and keep a good aberration balance between a wide angle end and a telescopic end.

4. The invention in claim 5 relates to a zoom lens which has a lens being closest to the spatial optical modulation element and having an Abbe's number of up to 30 in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 4") in claim 5 has the technical feature of defining the closest lens' Abbe's number to up to 30 in order to enhance the performance of the zoom lens while minimizing the magnification chromatic aberration of a lens as a whole.

5. The invention in claim 6 relates to a zoom lens that satisfies a conditional expression (4) in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 5") in claim 6 has the technical feature of defining the above conditional expression (4) in order to minimize magnification chromatic aberration of three colors, red, green and blue.

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6. The invention in claim 7 relates to a zoom lens that satisfies a conditional expressions (5), (6) in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 6") in claim 7 has the technical feature of defining the above conditional expressions (5), (6) in order to minimize magnification chromatic aberration of three colors, red, green and blue.

7. The invention in claim 8 relates to a zoom lens that satisfies a conditional expressions (7)-(11) in addition to having a technical feature in claim 1.

The invention in claim 9 is an invention in a dependent-type claim referring to the above claim 8.

And, the inventions (hereinafter called "invention group 7") in claims 8 and 9 have the technical feature of defining the above conditional expressions (7)-(11) in order to minimize magnification chromatic aberration of three colors, red, green and blue.

8. The invention in claim 10 relates to a zoom lens that has three lenses, a meniscus positive lens with its convex plane facing the screen side, a positive lens and a positive lens, arranged from the spatial optical modulation element side to the screen side in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 8") in claim 10 has the technical feature of arranging three lenses, a meniscus positive lens with its convex plane facing the screen side, a positive lens and a positive lens from the spatial optical modulation element side to the screen side in order to be able to reduce the effect of an unnecessary light reflected off the plane of a lens closest to the spatial optical modulation element and decrease spherical aberration.

9. The invention in claim 11 relates to a zoom lens of five groups, negative, positive, positive, negative, and positive that specifies the lens structure of a third lens group and a fourth lens group in addition to having a technical feature in claim 1.

And, the invention (hereinafter called "invention group 9") in claim 11 has the technical feature of providing the lens structure of the above zoom lens in order to achieve a small distortion aberration, a good on-axis chromatic aberration, and a good magnification chromatic aberration at each magnification of the zoom lens.

10. The invention in claim 12 relates to a zoom lens of four groups, negative, positive, negative, and positive that constitutes a first lens group with a 11th lens group and a 12th lens group, the distance between the both being changed at focus adjusting in addition to having a technical feature in claim 1.

The invention in claim 13 is an invention in a dependent-type claim referring to the claim 12.

And, the inventions (hereinafter called "invention group 10") in claims 12 and 13 have the technical feature of providing the lens structure of the above zoom lens in order to achieve a small distortion aberration, a good on-axis chromatic aberration, and a good magnification chromatic aberration at each magnification of the zoom lens.

The inventions in claims 14-16 merely specify the specific matters of the specification such as the magnification of a whole lens system, an F number at a wide angle eng, a zoom ratio in addition to having a technical feature in claim 1, and no particular technical feature is added.

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The inventions in claims 17 and 18 relate to a video magnifying/displaying system, a video projector or the like provided with a zoom lens as a projection means in addition to having technical features of inventions in claims 1-16, and only a conventionally known matter is added with no particular technical feature added.

The inventions in claims 19 and 20 relate to a rear projector and a multi-vision system provided with a video projector in addition to having technical feature of the invention in claim 18, and only a conventionally known matter is added with no particular technical feature added.

There exist no matter that is common to invention group 1 through invention group 10 and to be considered to be the same or corresponding special technical feature, except for a matter specified in claim 1 that is not novel to the conventional technology and has no technical feature that define a contribution made over the prior art, that is, there exists no technical relationship among them involving the same or corresponding special technical feature within the meaning of PCT Rule 13.2, second sentence, and the above invention groups are not a group of inventions so linked as to form a single general inventive concept.

Accordingly, these invention groups are not so linked as to fulfill the requirement of unity.

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